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Figures of Generation

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W. Turner.

1866



ON  
MALFORMATIONS  
OF THE  
ORGANS OF GENERATION.  
SECOND SERIES.

FŒTATION IN A RUDIMENTARY UTERINE CORNU.

BY

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## ON MALFORMATIONS

OF

# THE ORGANS OF GENERATION.

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IN the months of January and February 1865, I recorded in this Journal several cases of congenital malformation of the organs of generation. Amongst these was a series of cases, obtained from the dissecting-room, of malformed uteri, all of which were in the unimpregnated state. During the past year I have had the opportunity, through the kindness of Sir James Y. Simpson, of dissecting two additional specimens of the uterus bicornis, in each of which one horn was in a rudimentary condition, but impregnated. I purpose describing these cases in this communication, and discussing the mode in which impregnation had been effected.

CASE 1.—*Uterus bicornis unicollis. The left horn rudimentary and pregnant. Rupture of the left horn, and escape of the fœtus into the cavity of the peritoneum.*

In the month of May 1865, I received for examination from Professor Sir James Y. Simpson a preparation consisting of a uterus and appendages, with the vagina and bladder attached, which had been sent to that gentleman by Dr Brotherston of Alloa. An inspection of the preparation soon satisfied me that it was one of much interest, and I requested Dr Brotherston to furnish me with some of the particulars of the case, with which request he has very kindly complied. His account is as follows: "I was called on the morning of the 11th of May to visit C. G., about 20 years of age, who had just been taken suddenly ill. I found her lying in bed with her clothes on; she was pulseless, very pallid, and drawing heavy sighs. She complained of sickness, swimming in the head, and ringing in the ears. On examining the abdomen, I could not discover anything unnatural, but there was slight pain on pressure. I ordered her brandy and warm water, with a large sinapism to the



abdomen. She did not retain the brandy, but vomited it almost immediately. I examined the os uteri and found it a little relaxed. There was no vaginal discharge. I gave her more brandy and water and left her. I saw her again about half-past nine, and found no improvement in her symptoms; if anything she appeared weaker, and was evidently sinking. Dr Duncanson kindly saw her with me, but she died about noon the same day. By order of the procurator-fiscal, a post-mortem examination was made by Dr Duncanson and myself. The body presented nothing unusual externally. The scalp and pericranium were blanched, but the brain, with its membranes, and the thoracic viscera were all in a healthy condition. The cavity of the abdomen was next examined, and found to contain a large quantity of blood, to the extent of four and a-half pounds. This blood, the source of which was not at first apparent, we carefully removed, and a foetus was discovered lying in the cavity of the peritoneum, which had apparently reached the period of three months. The foetus was enveloped in its membranes, which were unruptured. The uterus itself was found to be a little enlarged, but empty, and displaced to the right side by the pressure of the foetus. Death had evidently been occasioned by hæmorrhage due to rupture and escape of the foetus into the cavity of the peritoneum."

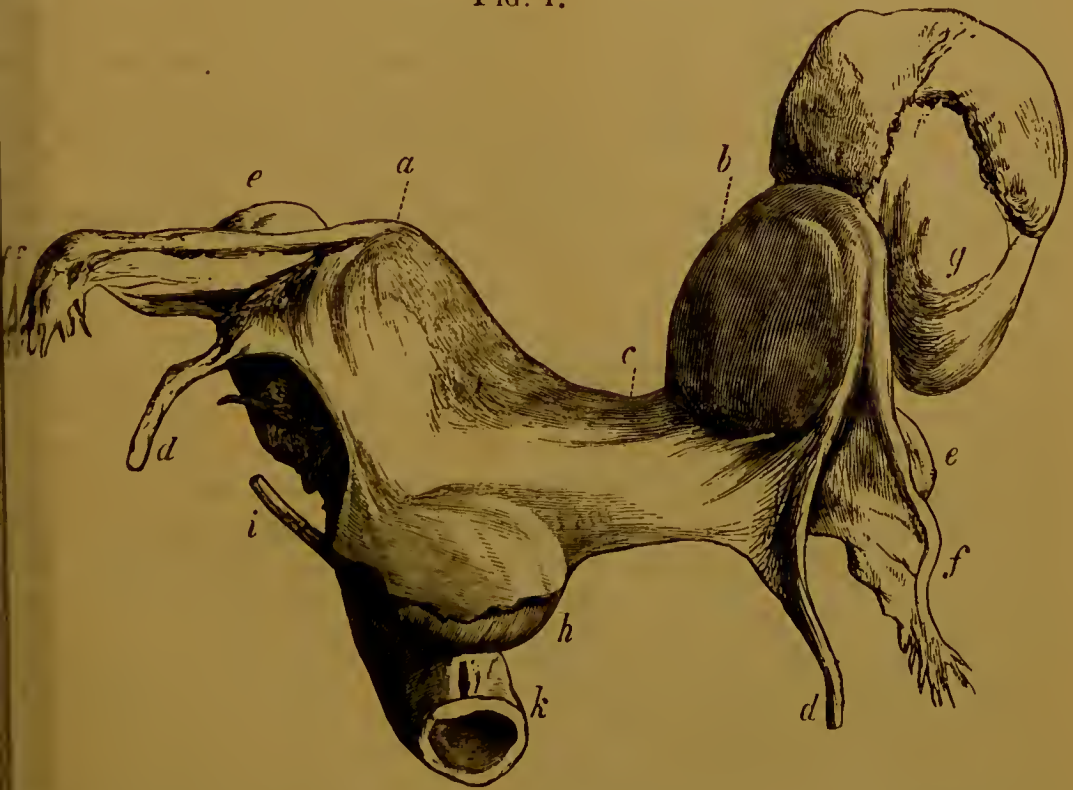
A careful consideration of the anatomical characters of the preparation led me to form the conclusion that I had before me one of those interesting cases of malformation of the uterus in which the primary or embryonic subdivision of the organ into two distinct cornua had remained as a persistent condition in adult life. One of the cornua, viz., the left, not so fully developed as the other, was impregnated, and the hæmorrhage attendant on the rupture of this horn had evidently been the cause of the death of the patient. That this was the nature of the preparation may be gathered from the following description :—

Connected in the usual manner with the upper end of the vagina (*k*) was the cervix uteri, which was continued into a somewhat ovoid-shaped organ (*a*), looking at first sight like the body of the uterus, but which a close examination showed to be not the entire organ, but only the right cornu of a two-horned uterus. For, instead of lying in the same line as the vagina and cervix, it inclined obliquely upwards and to the right, and terminated superiorly in a rounded end. It was invested by peritoneum anteriorly, posteriorly, and on its left side, whilst from the right side the membrane passed away from it, forming the folds of the right broad ligament. The left margin was convex and free. The extreme length from the os externum to the apex of this horn was nearly four inches, whilst the greatest breadth of the cornu was about two inches. The right round ligament (*d*), Fallopian tube (*f*), and ovary (*e*), with its ligament were connected to the apex of this horn. Their relation to each other at their points of attachment



was as in a well-formed uterus. The Fallopian tube, including its fimbriæ, was four and three quarter inches long. Air blown in at the fimbriated end entered the cavity of the cornu. The right round ligament arose from the cornu by a broad expanded portion, some of the fibres of which extended as far as the junction of the horn with the cervix. The organ of Rosenmüller was well seen in the ovario-tubal fold of peritoneum. The walls of this uterine horn were thicker than those of the unimpregnated uterus, and the cavity contained a thick and firm decidua, but no foetus. The cervix was filled by a plug of tenacious mucus. The vagina, os, and cervix were single. The cavity of the right cornu was continuous with the cervical canal. The ovary was flattened on both its surfaces, and from the anterior a small pea-like pedunculated tumour projected. It contained no corpus luteum, but faint traces of old cicatrices were seen on its outer surface.

FIG. I.



*Note of Explanation to FIG. I.*—The parts are exhibited with as small a disturbance of their proper relations as possible. *a*, right; *b*, left uterine cornu. *c*, pedicle of latter covered by peritoneum. *d d*, round ligaments. *e, e*, ovaries. *f, f*, Fallopian tubes. *g*, foetus and membranes. *h*, bladder. *i*, ureter. *k*, vagina. FIGS. I. and II. are engraved from careful drawings of the preparations made by my pupil Mr Richard Caton.

Springing at almost a right angle from the left side of the right uterine cornu, close to its place of junction with the cervix, was a flattened band (*c*), which acted as a sort of foot-stalk of attachment to the dilated part of the left cornu, and may therefore be appropriately called the pedicle. This band extended upwards and to the left for somewhat more than one inch and a-half, and then

became continuous with, or rather expanded into, the dilated portion of the left uterine cornu (*b*). The pedicle measured one inch and a quarter in circumference. It was invested by peritoneum, which was continuous on the one hand with the peritoneum covering the left,—on the other with that covering the right uterine cornu and bladder. When this membrane was removed, the pedicle was found to be principally composed of muscular fasciculi, but a number of dilated bloodvessels, both arteries and veins, ran along it to the dilated part of the left horn. This horn was somewhat pyriform in shape; its circumference at its widest part was about nine inches. Along the outer and posterior part was a rupture three inches long, through which a foetus, invested by its membranes, together with a vascular placenta-like mass, was extruded. To the proper apex of this horn the round ligament (*d*), Fallopian tube (*f*), ovarian ligament and ovary (*e*) of the left side, possessing their normal relations to each other, were attached. The uterine end of the tube was about three and a-half inches from the spot where the pedicle expanded into the cornu. The Fallopian tube, measured from its place of attachment external to the dilatation, was, including its fimbriæ, five inches long. Air blown into its fimbriated end readily entered the cornu. The organ of Rosenmüller could be plainly seen in the ovario-tubal peritoneal fold; a cyst the size of a small hazel-nut, apparently a dilatation of one of its tubules, was connected to the outer end of this organ. The anterior surface of the left ovary was flattened, but the posterior presented a well-marked bulging at its outer part, which, on section, was found to be the seat of a corpus luteum. The ovary exhibited a cicatrized appearance externally. The round ligament was expanded at its origin, and extended from close to the Fallopian tube down to the pedicle. The wall of the left cornu was muscular, like that of a pregnant uterus, and at the place of rupture the placenta could be seen partially adherent to its inner surface. The pedicle was examined very minutely to see if any canal connecting the cavity of the impregnated horn with that of the right horn, or the cervix, or vagina, could be seen, but none could be detected, although, in the course of the examination, the muscular fasciculi of which the pedicle was composed were dissected from each other; neither could any orifice at either of the extremities of the pedicle be detected.

CASE 2.—*Uterus bicornis unicollis.* The left horn rudimentary and pregnant. Retention of the foetus after the full period of utero-gestation.

After completing the examination of the specimen just described, I asked permission of Sir James Y. Simpson to look through the large stock of preparations contained in his obstetrical museum, to see if it included anything of a similar nature. He very courteously acceded to my request, and has permitted me to give an account, in this place, of the very interesting and as yet unrecorded

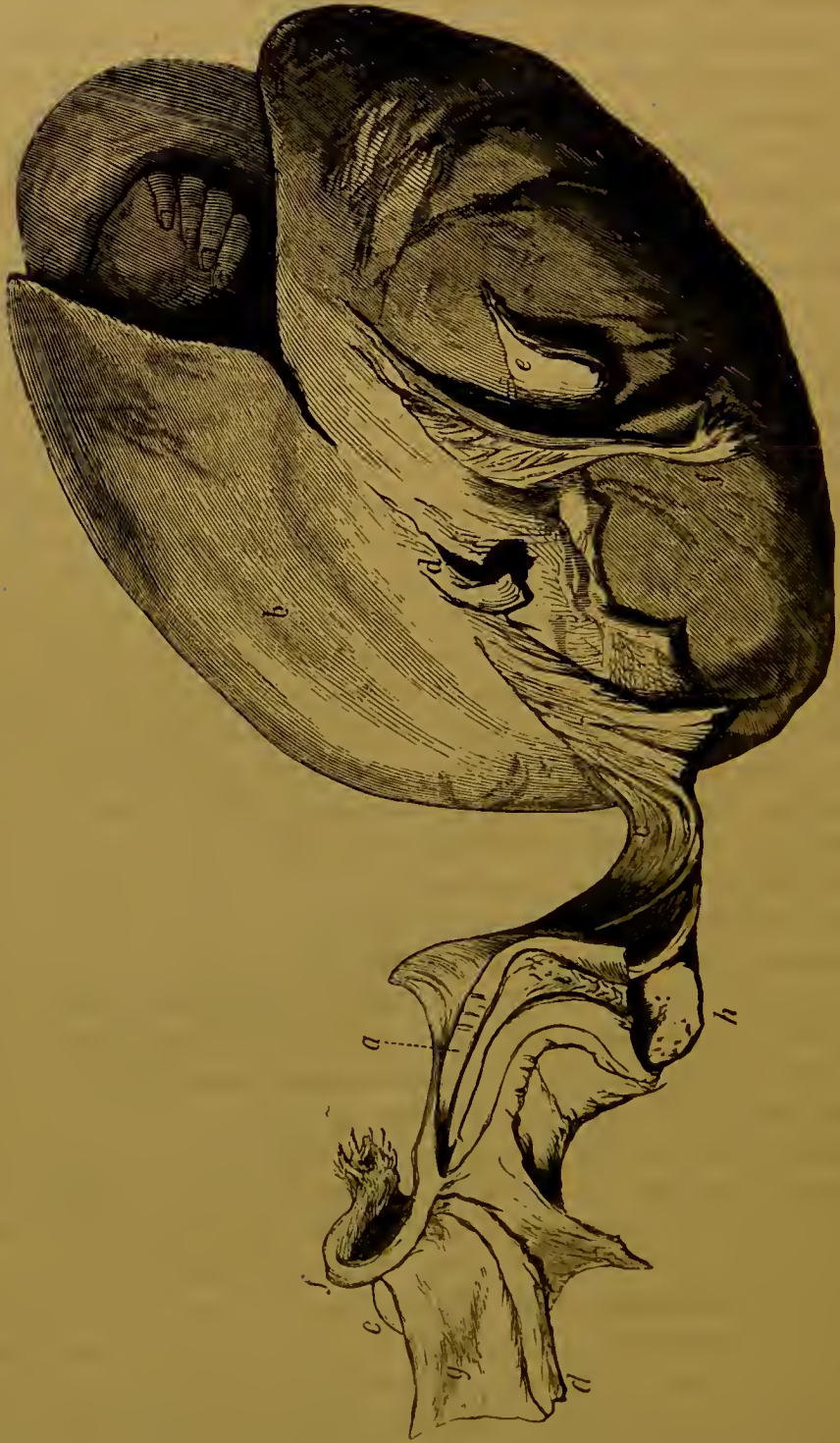


specimen I shall now describe. The specimen had been sent to Sir James Y. Simpson by Dr Scott of Dumfries, and from the latter gentleman the following history has been obtained:—"I was called on to attend Mrs M'Q., æt. 35, a married woman, who was stated to be in severe labour and at her full time. On examination I found the os uteri low down in the vagina, and I then could easily find the uterus of a natural size and unimpregnated. There was an enlargement of the abdomen extending a little to the left side, and nearly of the same size and shape as a uterus, containing a foetus at the full period of utero-gestation. The foetal heart was easily heard, and the motions of the child were strong. The pains were very severe, and complicated with convulsions for a whole day, in spite of a free use of chloroform, which certainly modified them. The pains continued for several days, and then the patient began to go about as usual to the astonishment of her friends and neighbours. The enlargement of the abdomen became gradually less, so that at the time of her death (which took place from phthisis, six months after the date of the supposed labour) it was not more than one third of its original size when I first saw her. The parts, including the empty uterus and appendages, were carefully removed on a post-mortem examination, and sent to Professor Simpson."

The preparation had been lying for a considerable time in spirit, and the textures had consequently lost their normal colour. The most prominent feature in the specimen was a large irregularly ovoid sac, measuring about twenty-seven inches in its greatest circumference. This sac contained a male foetus, apparently about the full time, which was attached by a funis, one foot in length, to a shrivelled placenta, which, in its turn, was connected to the inner surface of the sac. One side of the sac was affixed by a pedicle to the cervix uteri, from which a structure, looking at first sight like the body of the unimpregnated uterus, proceeded. The problem which had to be solved, therefore, was the nature of the sac in which the foetus was contained. Was it something altogether foreign to the uterus? Was it a dilated Fallopian tube? Or, was the case one in which the primary division of the uterus in two cornua, persisting to adult life, had permitted foetation to take place in one of the horns, leaving the other in the unimpregnated state? From a careful examination of the anatomical characters of the preparation, I have satisfied myself that the last named is the correct view to be taken of the case.

A portion of the uterine end of the vagina (*h*) had been preserved, and from its upper part the cervix uteri (*i*), one inch in length, proceeded in the usual manner. Continuous with the upper part of the cervix was an ovoid-shaped organ (*a*), one inch and a-half long, which, instead of possessing the normal direction of the uterus, inclined obliquely upwards and to the right, and terminated in a somewhat pointed extremity, from which the right round ligament (*d*), Fallopian tube (*f*), and ovarian ligament with its ovary (*e*), proceeded. Its

FIG. II.



*Note of Explanation to FIG. II.*—The letters indicate the same parts as in Fig. I., except that *g* is the broad ligament, *h* the vagina, and *i* the cervix uteri.



left margin, convex and free, was invested, together with its anterior and posterior surfaces, by peritoneum, which membrane passed away from the right margin of the organ, and formed the broad ligament (*g*). The organ was evidently, therefore, the right uterine cornu. When cut into, the canal in its interior was seen to be continuous with the upper part of the canal of the cervix, the two forming an obtuse angle with each other. By its opposite extremity, the canal communicated with the interior of the right Fallopian tube (*f*), which was pervious throughout. Several bands of false membrane were affixed to the posterior aspect of this uterine horn, and the Fallopian tube, about two and a-half inches in length, was firmly tied down and permanently curved on itself, by adhesions of a similar nature. There was no mucous plug in the cervix uteri, and no decidual structure in the right cornu, and the walls of the latter presented no increase of thickness over what is seen in the unimpregnated state.

Attached to the left side of the cervix was a strong muscular band or pedicle (*c*), two inches long by one broad, which passed to the left and ended in the wall of the foetus-containing sac (*b*), already described. The fibres of which this band was composed were continuous with those of the cervix and right horn on the one hand, and with those of the sac on the other. The band was invested by peritoneum, which was also continuous with the serous covering of the right horn and the sac. Dilated arteries and veins ran along the pedicle to the sac. The left Fallopian tube (*f*) with its peritoneal fold was connected to the proper apex of the ovoid sac: two and a-half inches from and posterior to the point of attachment of the tube, the ovarian ligament with its ovary (*e*), and at about the same distance from, but anterior to the tube, the round ligament (*d*) arose from the wall of the sac. The distance between the place of termination of the pedicle and the point of attachment of the Fallopian tube was a little more than four inches. From these relations there can be no doubt but that the sac was the dilated and impregnated left uterine cornu; the increased distance between the points of attachment of the various structures connected to the apex of the cornu, as compared with the corresponding parts on the right side, being due to the growth of the walls of the sac, which had occurred during gestation. The left Fallopian tube, measured from where it arose from the sac, was five inches in length; and a fine probe could be passed along it up to the wall of the sac, but its inner orifice was obstructed. No adhesions interfered with its mobility. The organ of Rosenmüller was distinctly seen in the ovario-tubal peritoneal fold; but on the right side, from the thickened state of the membrane, this structure was not visible. The surfaces of both ovaries were flattened, and showed faint traces of old scars. No corpora lutea were to be seen.

As it was of importance to ascertain the nature of the communication between the interior of the impregnated left uterine cornu and

the canal of the vagina, cervix, or unimpregnated horn, a careful examination of the pedicle was instituted; but neither at its cervical end nor where the pedicle expanded into the sac of the left horn could any opening be detected. The peritoneum was then carefully dissected off the pedicle, and with a sharp knife a section was made through the structure at right angles to its long axis. When the surface of this section was examined, several small openings were seen. The question now was, Could any of these openings be a divided canal extending along the pedicle, or were they all divided bloodvessels? To determine this, I introduced an injecting pipe into more than one of the vessels already described as extending along the pedicle, and forced a coloured fluid along it. The fluid oozed out at the various openings, and thus established their connexion with the vascular system. Through the larger openings, also, it was possible to pass bristles into the bloodvessels. I was thus forced to the conclusion that the pedicle did not contain any canal connecting the impregnated horn with the vagina, cervix, or cornu of the right side.

The appearance presented by the foetus, placenta, and walls of the sac, indicated very clearly that all active changes had been suspended in them some time before the death of the mother. Absorption of the foetal tissues had commenced, more especially in the dorsal region, where a large patch of skin, with the subjacent muscles, had disappeared, and the ribs and laminae of the vertebrae were exposed. The placenta was tough and shrivelled, —much more so than would have been produced by the action of the spirit of wine with which the specimen had been preserved. The walls of the uterine sac were thin and atrophied. In places the muscular fibres had almost entirely disappeared, and large calcareous plates, indicating an extensive degeneration of the walls of the sac, were abundantly distributed over the inner surface.

In the following remarks, I shall confine myself to a consideration of those features in the two cases I have just related, which possess an anatomical and physiological interest; for the symptoms, diagnosis during life, and treatment of cornual gestation, fall more within the province of the accoucheur than the anatomist. In the first place, then, it may be as well to consider what the anatomical characters are by which cases of cornual pregnancy may be distinguished from tubal pregnancies, with which, on a hasty inspection, they are apt to be, and indeed have not unfrequently been, confounded. And it may be the more advisable to point out what these diagnostic characters are, because, in this country at least, the subject has received but little attention.

In forming the diagnosis, the structures to which the attention should especially be directed are the round ligament and the Fallopian tube of the impregnated side, and their relative position and place of origin should be carefully determined. In a normal



uterus, the round ligament, as is well known, springs from the upper angle of the uterus immediately in front of the Fallopian tube. If the pregnancy be tubal, the round ligament will, as a matter of course, be found attached to the body of the womb on the inner or uterine side of the dilated sac containing the embryo: if, on the other hand, the pregnancy be cornual, then the point of attachment of the round ligament will be on the outer side of the dilated sac in which the foetus is situated. In both the specimens I have just recorded, the latter relation was the one observed. In tubal pregnancies, also, the length of the Fallopian tube on the impregnated side, external to the dilatation, is necessarily less than that of the entire extent of the unimpregnated tube, and the diminution in length is more strongly marked the nearer the sac lies to the fimbriated extremity. In cornual pregnancies, on the other hand, no diminution in the length of the tube on the impregnated side occurs,—nay, as both these cases show, the tube on that side external to the embryo-containing sac may even be longer than that on the side which is unimpregnated.

The period up to which gestation may be carried on, and the size which the sac and the foetus it contains may acquire, appear also to possess certain distinctive features in the two forms of pregnancy. In a true tubal conception the period of gestation seldom continues beyond the third or fourth month, except in those rare cases where the ovum is detained in the trumpet-shaped mouth of the tube, when the gestation may go on to the full time.<sup>1</sup> The sac also in which the embryo is contained is generally of a globular form, and seldom attains a greater size than a large orange, when it bursts and occasions the death of the mother from the hæmorrhage consequent on its rupture. Moreover, the enlargement of the Fallopian tube is not general, but confined to the part where the impregnated ovum is lodged, the walls of the tube are not hypertrophied, and the canal remains pervious both on the distal and proximal sides of the dilatation. In a cornual conception, again, the period to which gestation may be carried on varies with the state of development of the horn in which impregnation has taken place. When it is well formed and communicates freely with the canal of the cervix and vagina, then gestation may go on to the full period, and the child may be born in the usual manner. When the impregnated horn, however, is rudimentary in its development, more especially if the canal of communication between it and the cervix and vagina is partially or wholly obstructed, then the expansion of the horn necessary to complete the full time of pregnancy may be interfered with, and rupture at the third or fourth month may occur. This mode of termination of a cornual foetation is well illustrated by the case occurring in Dr Brotherston's practice, which I first detailed. But even with a rudimentary horn and an

<sup>1</sup> A very illustrative case of this kind is related by Mr Louis R. Cooke in the Transactions of the Obstetrical Society of London, vol. v. p. 143.

obstructed passage, as the very remarkable case met with by Dr Scott proves, not only may gestation go on to the full time without rupture, but the foetus may even be retained for several months within the dilated cornu without occasioning much inconvenience.<sup>1</sup> In a cornual foetation, also, the impregnated horn is not globular, but rather pyriform or ovoid in shape, corresponding, in fact, more to the form of the unimpregnated cornu; and instead of the enlargement being confined to one spot, the entire horn, sympathizing with the process taking place in its interior, participates in the change, and the placenta, foetus, and membranes completely fill the cavity.

It will not be without profit if we now turn to the literature of the subject, and glance at some of the cases of cornual foetation which have been recorded by previous writers; and in my inquiries into this department of my subject, I have been very materially assisted by the valuable treatise of Professor Kussmaul on Malformations of the Uterus.<sup>2</sup> The cases to which I shall more especially refer are those in which one of the horns of a two-horned uterus has been more or less rudimentary, and in which pregnancy had occurred in this rudimentary or accessory cornu (*nebenhorn*).<sup>3</sup> Commencing with a case recorded so far back as the year 1681, Kussmaul relates eleven cases by Dionis, Canestrini, Pfeffinger and Fritze, Tiedemann and Czihak, Joerg and Güntz, Drejer, Ingleby, Heyfelder, Rokitansky, Scanzoni, and Behse, in which undoubtedly pregnancy had occurred in a rudimentary uterine cornu. The nature of the foetation had been recognised in several of the cases by the original describer; but in those recorded by Pfeffinger and Fritze, Tiedemann and Czihak, Joerg and Güntz, Drejer, Ingleby, Heyfelder, and Behse, the pregnancies had been looked upon as tubal, and their true nature had not been correctly stated until Professor Kussmaul's work appeared.

Since its publication, other cases have been put on record in which foetation in a rudimentary cornu had been found. In 1860, Professor Virchow<sup>4</sup> related a case in which a rudimentary left uterine cornu, attached to the cervix by a tolerably thin pedicle, was enlarged to a globular swelling, in which a foetus was situated. Three years ago, Professor Luschka<sup>5</sup> described a case, the nature of

<sup>1</sup> The case recorded by Pfeffinger and Fritze (Kussmaul, p. 132) furnishes still more striking evidence of retention of the foetus developed in an accessory uterine cornu. From the history, it would appear that the child was retained so long as thirty-one years after the impregnation. A distinct canal does not seem to have been recognised in the pedicle connecting the rudimentary with the more fully developed horn in this case of Pfeffinger's.

<sup>2</sup> *Von dem Mangel, der Verkümmernng und Verdopplung der Gebärmutter.* Würzburg, 1859.

<sup>3</sup> In Kussmaul's work these cases are related in the ninth chapter under the head of pregnancies in a one-horned uterus with a stunted accessory horn, but it seems to me that the description employed in the text more exactly expresses their nature.

<sup>4</sup> Abstract in *Canstatt* for 1860, p. 420.

<sup>5</sup> *Monatsschrift für Geburtskunde*, vol. xxii. p. 31; Berlin, 1863.



which he fully recognised, where a right rudimentary horn was pregnant, and where rupture took place about the third month. In the year 1863, Dr Haydon exhibited to the Obstetrical Society of London, as an example of tubal foetation, a preparation which was reported on by Drs Tyler Smith and Braxton Hicks, and described and figured in the 5th volume of the Transactions of the Society as a case of extra-uterine foetation. From the drawing and description, I am of opinion that it is a case of pregnancy in a right uterine cornu. The organ which the reporters call the uterus is evidently only the left uterine cornu, enlarged in sympathy with the pregnant horn on the opposite side, for only one Fallopian tube and one ovary are connected to its upper part. The structure which they describe as the right tube passing off from the uterus at one inch and a-half below the fundus, is evidently the right rudimentary cornu, and corresponds to the part I have termed the pedicle in the description of the cases given in the early part of this paper. Beyond the pedicle is the dilated sac, in which the foetus had been situated before the rupture which occasioned the death of the patient had occurred. This sac corresponds in position to the dilated part of the right horn, and to it the ovary is described as being connected. The reporters consider that the right tube is not only much longer than the left, but displaced in its position; but this apparent discrepancy in the arrangement on the two sides is due to the circumstance, that they have included in their measurements of the right tube not only that structure but the right rudimentary cornu also. A case recorded in the 6th vol. of the Transactions of the same Society by Dr Edwin Day as a tubal foetation, appears also to be an example of pregnancy in a right rudimentary cornu: for the structure described as the Fallopian tube of the right side is stated to have been attached to the base of the uterus, and in it a tumour containing an organized clot and remains of deciduous membrane are said to have been situated. The place of attachment of this tube inclines me to form the conclusion that it was a rudimentary uterine cornu.<sup>1</sup>

In the cases which have been recorded by different authors, the exact point of connexion of the rudimentary cornu to the more perfectly developed horn presented some variations. In both of my

<sup>1</sup> In the British Medical Journal, Dec. 17, 1859, a case is reported by Dr Hancox as tubal pregnancy, which seems in some respects to correspond more with a cornual than tubal foetation. The anatomical details are, however, too meagre to enable one to give a positive opinion. The child had reached nearly the full period before rupture and extrusion into the abdomen had occurred. The walls of the cavity in which the child had been situated were thin at the point of rupture; but below this spot they were much thickened, like the substance of the heart. Body of the uterus not enlarged and healthy. The pregnancy is described as in the right Fallopian tube, and the communication between it and the uterus was perfectly occluded. The sac containing the foetus is described as presenting all the appearance of a gravid uterus at the full period of gestation, which circumstance, together with the thickness of its wall, points rather to a cornual than a tubal pregnancy.

eases, and in those of Canestrini, Ingleby, and some others, it was attached to the cervix; but, in the preparation originally described by Tiedemann and Czihak, and re-examined with great care by Kussmaul, it was connected with a considerable portion of the side of the body of the developed cornu, and reached almost to the top of its fundus; whilst, in the case of Heyfelder, the attachment was to the lower part of the body of the developed horn, but above the cervix.

In cases of uterus bicornis unicollis, where both horns are symmetrically developed, their cavities communicate freely with the canal of the cervix, as may be seen in Fig. III. of my first series of cases. But when one of the horns has been retarded in its development, or if it has become more or less atrophied, it then assumes an accessory or rudimental character. As a consequence of this, the size of the cavity at its cervical end may become considerably diminished, and even in some cases, as in those just described, may, I believe, no longer exist. The specimens which have been recorded illustrate the gradation from a well-marked open canal to a perfectly closed condition. In a case recorded by Cruveilhier,<sup>1</sup> a rudimentary right cornu communicated by a narrow but distinct canal with that of the cervix. In Seanzoni's case,<sup>2</sup> also, a distinct canal connecting the cavities of the two horns with each other extended along the pedicle, and opened high up into the cavity of the fully-developed right uterus. In Rokitansky's case,<sup>3</sup> the canal of the pedicle opened above the internal os, with an orifice the size of a millet seed. In the preparation described by Canestrini, one or perhaps two fine canals, large enough to admit a bristle, seemed to traverse the pedicle. In the case originally observed by Heyfelder, and re-examined with much care by Kussmaul (p. 149), a fine canal, commencing just above the internal os of the developed horn, extended for a short distance into the pedicle, but could not be traced into the cavity of the left impregnated cornu; and though Kussmaul inclines to the belief that it is the outlet canal of the left horn, he is unable to say so with certainty. In the cases described by Dionis, Tiedemann and Czihak, Ingleby, Luschka, as well as in those now recorded by myself, no canal could be seen in the pedicle; and it is expressly stated by Luschka, with whose specimen my dissections in this respect coincide, that no opening was found at the extremities of the pedicle, either in the rudimentary or fully developed cornu.

The questions may very naturally now be asked, Had this impervious condition of the pedicle existed before impregnation? or, Had a canal existed in the unimpregnated state which, during the process of gestation, had become obliterated? On the way in which they are answered will depend our conception of the mode

<sup>1</sup> Anat. Path., vol. i. liv. 4, Pl. 5, Fig. 2.

<sup>2</sup> Beiträge z. Geburtskunde, bd. i. h. i.

<sup>3</sup> Lehrbuch der Pathologischen Anatomie, 3d Ed. p. 450; Ed. 1861.



in which the fertilization of the ovum had been effected in these cases. The only authors, so far as I am aware, who enter into the consideration of these questions are Ingleby and Kussmaul. Ingleby<sup>1</sup> considers that the time of occurrence of the impervious state of the canal is quite a matter of speculation, "if a congenital malformation, seminal contact is out of the question, and we raise the almost exploded doctrine of absorption." Kussmaul (p. 164) thinks "it is improbable that such a canal had not existed before the conception, and it is equally improbable that the connecting band would have been originally solid. It is more probable that it had become closed up in consequence of the pregnancy, the closure occurring partly through pressure of the widened blood-vessels, and partly through a decidua-like growth of the mucous membrane of the connecting canal, as was observed in the case of Rokitansky."

I am by no means disposed to accept Kussmaul's argument on this matter as final and conclusive, for there does not seem to me to be sufficient evidence to show that, during the performance of any physiological process in which enlargement of the bloodvessels occurs, the pressure which they may exercise on surrounding parts is sufficient to occasion closure of such a canal as may have been supposed on Kussmaul's theory to have traversed the pedicle. In cases of true tubal conceptions, for example, where considerable enlargement of the vessels occurs, the closure of the tube does not necessarily occur beyond the immediate seat of the sac containing the embryo. If external pressure is to be regarded as a cause capable of producing closure of the canal, supposing one to have been present, then I should think the hypertrophy of the muscular fibres of the pedicle taking place during gestation would be a much more efficient agent in the process than the pressure of surrounding vessels, as the canal would, in all probability, have been more immediately invested by them than by the vessels. But here, again, there is a want of evidence that such an effect would have been produced, for hypertrophy of the walls of a gland-duct does not necessarily occasion obstruction of its canal. Neither does Kussmaul's theory of the blocking up of the canal by a decidua-like membrane, so that it could no longer be recognisable, seem to me to be tenable. For the question is not one of simple closure of orifices, such as so often occurs during pregnancy by the formation of the decidua at the uterine ends of the Fallopian tubes, but of the complete obliteration, so that no trace could be discovered after a most careful examination, of a canal between one and two inches in length. The case of Rokitansky, which Kussmaul advances in support of his theory, does not, indeed, bear it out; for though it is stated that the canal was lined by a decidua, yet Rokitansky makes no mention of its being obliterated, and he distinctly describes its orifice as situated above the internal os. Again,

<sup>1</sup> Edinburgh Medical and Surgical Journal, vol. xlii. p. 350, 1834.

there is positive testimony, as in the case by Seanzoni, that the formation of deciduous lining membrane within the canal in the pedicle of a rudimentary uterine cornu is by no means a necessary occurrence during impregnation.

From a consideration, then, of these various circumstances, and from the fact that in the cases which have been recorded, a regular gradation has been traced from a distinctly recognisable canal in the pedicle to that condition in which none could be detected, I am disposed to think that the pedicle must have been solid before impregnation was effected.<sup>1</sup> If this supposition be correct, the mode in which the ovum became fertilized may form a topic for further inquiry. It is obvious it could not have been by the direct channel, for closure of the canal of the pedicle necessarily cuts off all direct communication between the vagina and cervix, and the cavity of the rudimentary cornu. Neither would a revival of the old Harveian doctrine of absorption, as Ingleby suggests, help us out of the difficulty; for modern physiological research has clearly shown that it is necessary for impregnation, not only that the seminal fluid should come in contact with the ovum, but that the spermatozoa should penetrate into its interior. There remains, then, but one course which could have been taken by the seminal fluid in these cases, viz., along the cornu and Fallopian tube of the more perfectly developed side into the Fallopian tube of the rudimentary cornu, and then into the cavity of the latter.

But though such a theory may at first sight appear not a little strange, yet there are certain circumstances which give countenance and support to the possibility of a roundabout passage of the seminal fluid in these very exceptional cases. That the spermatozoa possess a remarkable power of spontaneous movement, and that during or after coitus they pass into the cavity of the uterus, there is, I suppose, no difference of opinion. That spermatozoa may also pass into the Fallopian tube there can be little question, as the numerous cases of true tubal conception which have now been put on record sufficiently testify. And without entering, on this occasion, into the much disputed subject of ovarian gestation, there is, I think, sufficient evidence before us to show that these bodies may pass through the fimbriated mouth of the Fallopian tube into the peritoneal cavity. For, in addition to the support which is given to this opinion by cases of abdominal gestation, Martin Barry and Bischoff have furnished positive testimony of the occasional occurrence of spermatozoa on the surface of the ovary in the rabbit and the bitch when examined shortly after coitus.<sup>2</sup>

<sup>1</sup> It may be objected to this view that, if the pedicle had always been impermeable, there would have been an accumulation of blood within the rudimentary cornu due to the pouring out of that fluid from its mucous membrane during successive menstrual periods. But we, as yet, possess scarcely any definite information respecting the conditions under which menstruation takes place in these rudimentary uterine horns.

<sup>2</sup> As additional evidence of the travelling power of the spermatozoa, I may



If the possibility of the passage of the spermatozoa up to, and even through the mouth of the fimbriated end of the Fallopian tube be admitted, we may next inquire if there is any evidence that the mouths of the two tubes can be so approximated as to permit of the transit of the seminal fluid from the orifice of one into that of the other. It seems to me that, in the two cases I have personally examined, and, so far as I can judge from the engravings which have been furnished by previous writers in illustration of their cases, an anatomical arrangement exists in connexion with the rudimentary cornu, which permits of such an approximation as I have referred to; for the pedicle which attaches it to the cervix or body of the more perfectly developed horn is so slender as would, I believe, permit to a considerable extent of the movement of the rudimentary horn towards the cornu on the opposite side. But quite independently of the special provision which seems to exist in these cases, there are various recorded facts which prove that in a well-formed uterus even, and still more so when conjoined, as in these cases, with a mobile pedicle, an approximation of the mouths of the two Fallopian tubes to each other is not impracticable. In the second of the two well-known cases of abdominal pregnancy recorded by Dr Oldham,<sup>1</sup> there is reason to believe that the left Fallopian tube must have received its ovum from the right ovary, for the corpus luteum was situated in the latter, whilst the fimbriated end of its corresponding tube was closed in by adhesions; the left tube, on the other hand, was open at its fimbriated extremity. In a case examined by Dr G. C. Watson,<sup>2</sup> the fimbriated mouth of the left Fallopian tube grasped a placenta-like mass, to which a three-months' foetus was connected by a funis. There was no corpus luteum in the left ovary, but one was apparently contained in the right ovary. In this case, it would seem as if the left tube had attempted to seize the ovum from the right ovary, but had not completely succeeded in the attempt. Dr Arthur Farre<sup>3</sup> states that a preparation (No. 722) exists in the Cambridge University Anatomical Museum in which both the tubes grasp the same ovary, to which their extremities are fixed by morbid adhesions. Rokitansky<sup>4</sup> also describes a case of pregnancy in which a corpus luteum was situated in the left ovary; but the corresponding tube was so constricted, twisted, and invested by adhesions, that

adduce the observations of Dr A. Clark (London Hospital Reports, vol. i. p. 223, 1864) on the occurrence of these bodies in the sediment of the urine taken directly from the bladders of dead men. If during or shortly after connexion, such a patent condition of the Fallopian tubes as Dr J. Matthews Duncan states (Edinburgh Medical Journal, November 1865) to be a not very rare occurrence, had existed, the passage of the spermatozoa upwards to the peritoneal cavity would necessarily have been materially facilitated.

<sup>1</sup> Guy's Hospital Reports, vol. iii. p. 272, 1845.

<sup>2</sup> Clay's British Obstetric Record, vol. i. p. 70, 1848.

<sup>3</sup> Article "Uterus," in Todd's Cyclopædia, vol. v. p. 622.

<sup>4</sup> Allg. Wiener Mediz. Zeitung, No. 20, p. 155, 1860.

its canal was impermeable. Now, if this closure of the left tube had occurred before impregnation, the passage of the ovum must have been from the left ovary through the right tube into the uterus.

The numerous cases which have now been recorded by obstetric writers of tubal and other forms of pregnancy, in which the corpus luteum was situated in the ovary of the side opposite to that on which the embryo was lying, show that a migration or wandering of the ovum from one to the opposite side is not impracticable.<sup>1</sup> But those who have inquired into this subject by no means agree as to the channel along which this migration is conducted. Some are of opinion that the ovum is seized by the Fallopian tube corresponding to its own ovary, along which it is conveyed into the uterus or cornu of that side, and then within the uterus across into the cornu or Fallopian tube of the opposite. This migration has been called intra-uterine. Others again hold that the wandering is due to the Fallopian tube grasping, or lying with its mouth close to, the ovary of the opposite side; so that the ovum enters it directly, and then descends to a greater or less distance along it. This migration has been called extra-uterine. Of these two theories I am disposed to regard the latter as the more probable.

In discussing this subject, it must be kept in view that the ovum of itself possesses no power of independent movement. Any change of place which it may undergo is due to the action of external forces. Its transit along the Fallopian tube and uterus is caused partly by the action of the ciliated epithelium covering the free surfaces of their mucous membranes, and partly by the contraction of their muscular walls. If, after having entered the uterus, internal migration of the ovum into the cornu or Fallopian

<sup>1</sup> There is no need why I should, in support of the statement made in the text, quote the cases in illustration which have been collected with so much industry by Kussmaul, as they may be consulted in his work, already so frequently referred to. It may be of service, however, if I give the references to other cases recorded since the publication, in 1859, of Professor Kussmaul's treatise. Dr A. Farre (op. cit.) states that he has noticed this circumstance in repeated instances. Luschka, in the case already quoted, of pregnancy in a right rudimentary cornu, met with the corpus luteum in the ovary of the opposite side. Schultze (*Monatschrift für Geburtskunde*, vol. xxiii. p. 222, 1864) records a case of tubo-uterine fœtation on the right side, with a corpus luteum in the left ovary. Dr M. T. Sadler (*Medical Times and Gazette*, 5th August 1865) relates a case of left tubal fœtation, with a corpus luteum in the right ovary. Von Wiedersperg (*Prager Vierteljahr*, Part iv. 1865, p. 23) describes a case of pregnancy in a right Fallopian tube, with the corpus luteum in the left ovary. Kussmaul himself (*Abstract in Brit. and For. Med.-Chir. Rev.*, Jan. 1863) has met with a case in addition to those he formerly described, in which a corpus luteum in the left ovary was conjoined with a right tubal pregnancy. This case seems to have materially modified Professor Kussmaul's opinion respecting the mode of passage of the ovum in these cases. In discussing the subject in his treatise, he supports the intra-uterine theory of transmigration, whereas, in his comments on this case, he advocates an extra-uterine mode of passage of the ovum.

tube of the opposite side were to take place, not only would the cilia clothing the epithelium of that side have to work in a reverse direction to their accustomed mode of action, but the contraction of the muscular wall of the tube or cornu would have to be reversed also, so as to send the ovum up the tube or horn, which, to say the least, is not very probable. Then the smallness of the uterine orifice of the tube would hinder the passage of the ovum from the uterus into it, unless some unusual patent state of that opening existed in such cases.

On the other hand, in support of the extra-uterine theory of migration, not only is there the positive testimony furnished by the preparation referred to by Dr Farre, that the Fallopian tube can grasp the opposite ovary, but the specimens examined by Dr Oldham and Professor Rokitansky show the possibility of an ovum passing into the uterus, or the opposite tuba, although the canal of the tuba belonging to the ovary from out of which the ovum proceeded was blocked up by adhesions. Hence, I am disposed to conclude that this latter theory presents fewer difficulties than the former.<sup>1</sup>

Now, if we grant the possibility of an extra-uterine passage of the ovum from an ovary to a tuba or cornu of the opposite side, there is yet stronger presumptive evidence in favour of an extra-uterine or intra-peritoneal passage of the spermatozoa in such very exceptional cases as those especially discussed in this memoir. For not only does there seem to be a special provision in the mobile mediele, to permit the approximation to each other of the mouths of the two Fallopian tubes, but the power of movement possessed by the spermatozoa themselves would facilitate their transit from one to the other, should an exact coaptation of their peritoneal orifices not have taken place.

<sup>1</sup> As bearing on the extra-uterine theory of the migration of the ova, not only in man but in other mammalia, I may just allude to the fact, that in some of the lower vertebrata, the amphibia more especially, the mouth of the Fallopian tube lies at some distance from the ovary, and the ova have to traverse considerable distance before entering it. For an account of the mechanism by which the transit of the ova is effected, see the section on Generation in Mr Baly's translation of Johannes Müller's Physiology, and the paper by Mr Newport in the Philosophical Transactions for 1851.





